

A More Realistic Representation of Sediment Remediation in Numerical Simulations: Application to the Lower Passaic River

James Wands, PE (james.wands@hdrinc.com), Edward Garland, PE, Badri Yadav, Rasa Bubnyte (HDR, Inc., Mahwah, NJ, USA) and Thalia Loor, PE (Louis Berger)

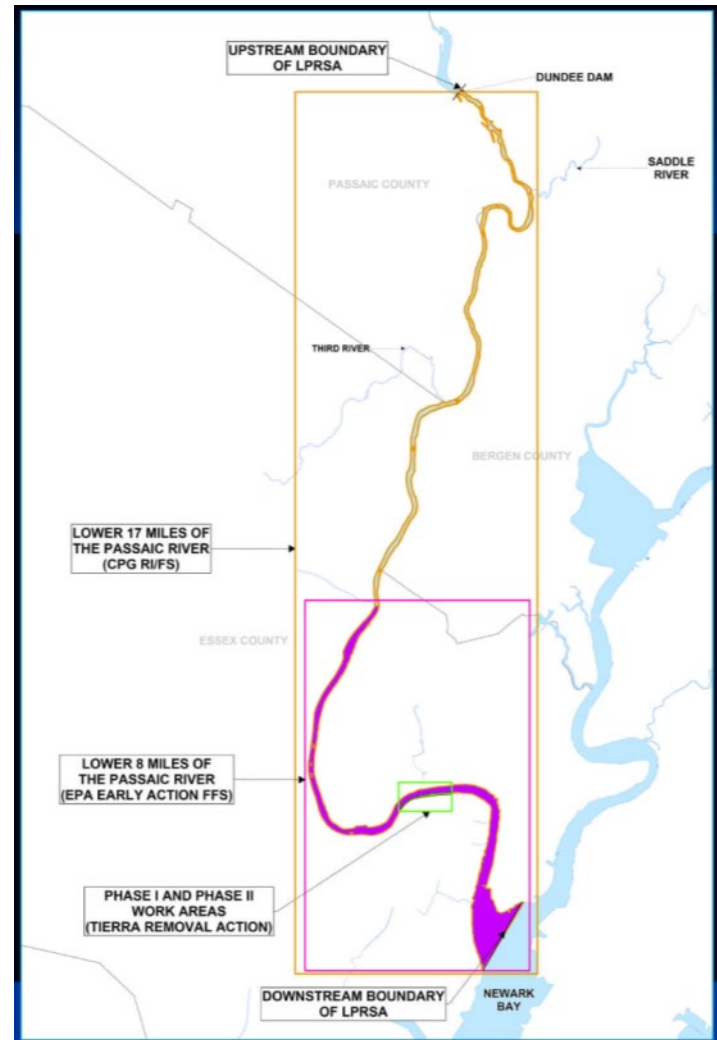
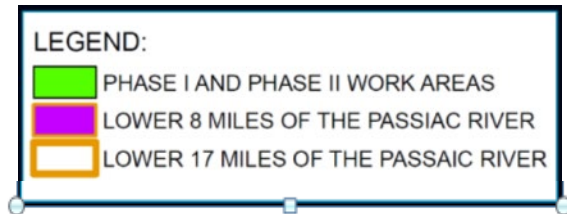
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Lower Passaic River

- Many chemical products, including the herbicide Agent Orange, were manufactured in facilities located adjacent to the Passaic River.
- EPA proposed cleanup plan – April 2014
- EPA Record of Decision – March 2016
- Selected Remedy: Capping with Dredging for Flooding and Navigation
- Agreement with Occidental Chemical Corporation to perform design work – September 2016



Components of Remedial Actions Represented in Models

- Set concentrations across the remedial footprint to zero
- Set concentrations across the remedial footprint to zero in a single model grid cell at a time based on a remedial schedule
- Release of contaminants due to dredging
- Release of solids and POC due to dredging
- Bathymetric changes due to dredging
- Bed composition changes associated with cap placement



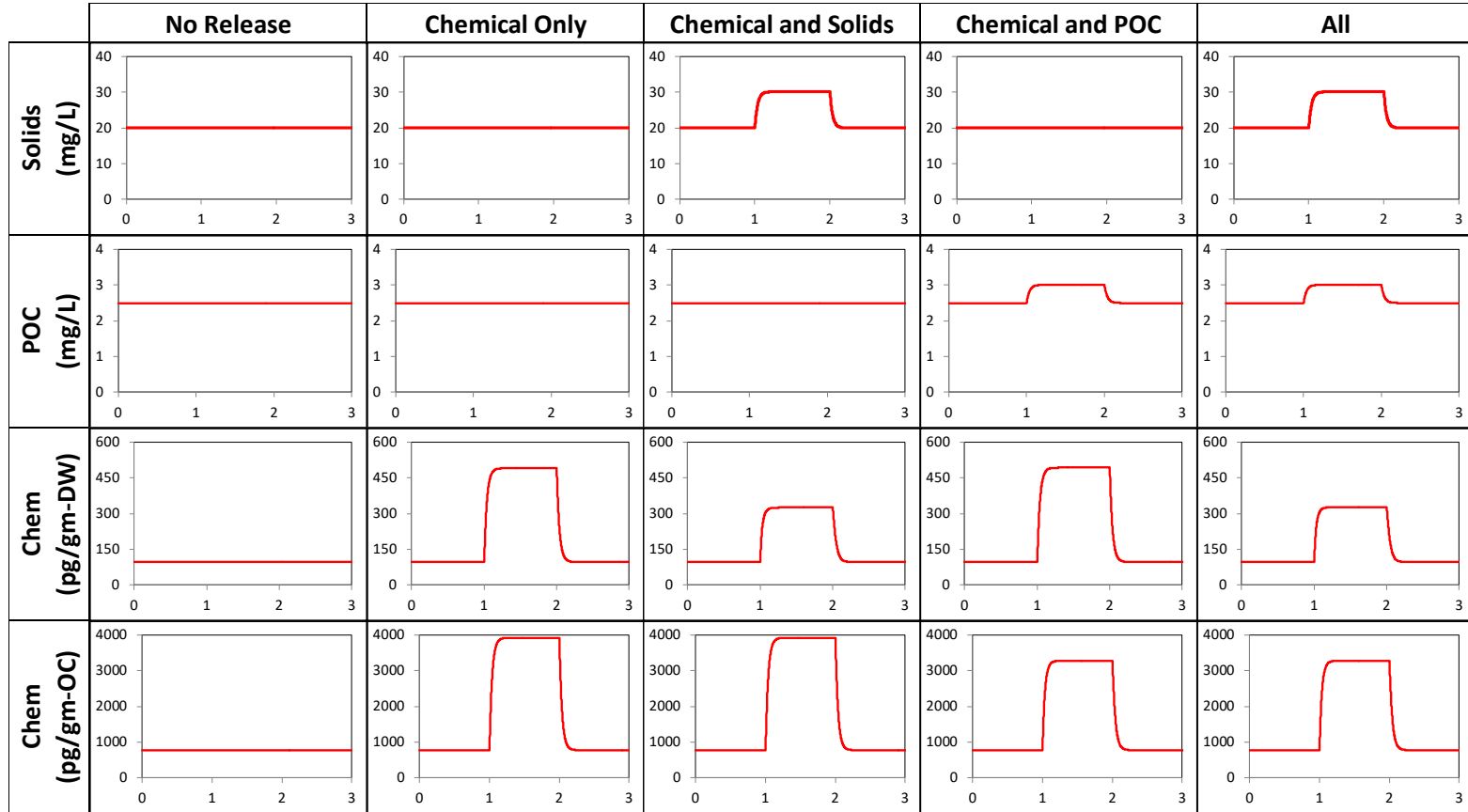
Simplified Case

Detention Time
≈ 60 Minutes

Sediment
Concentration
= 800 pg/gm-DW

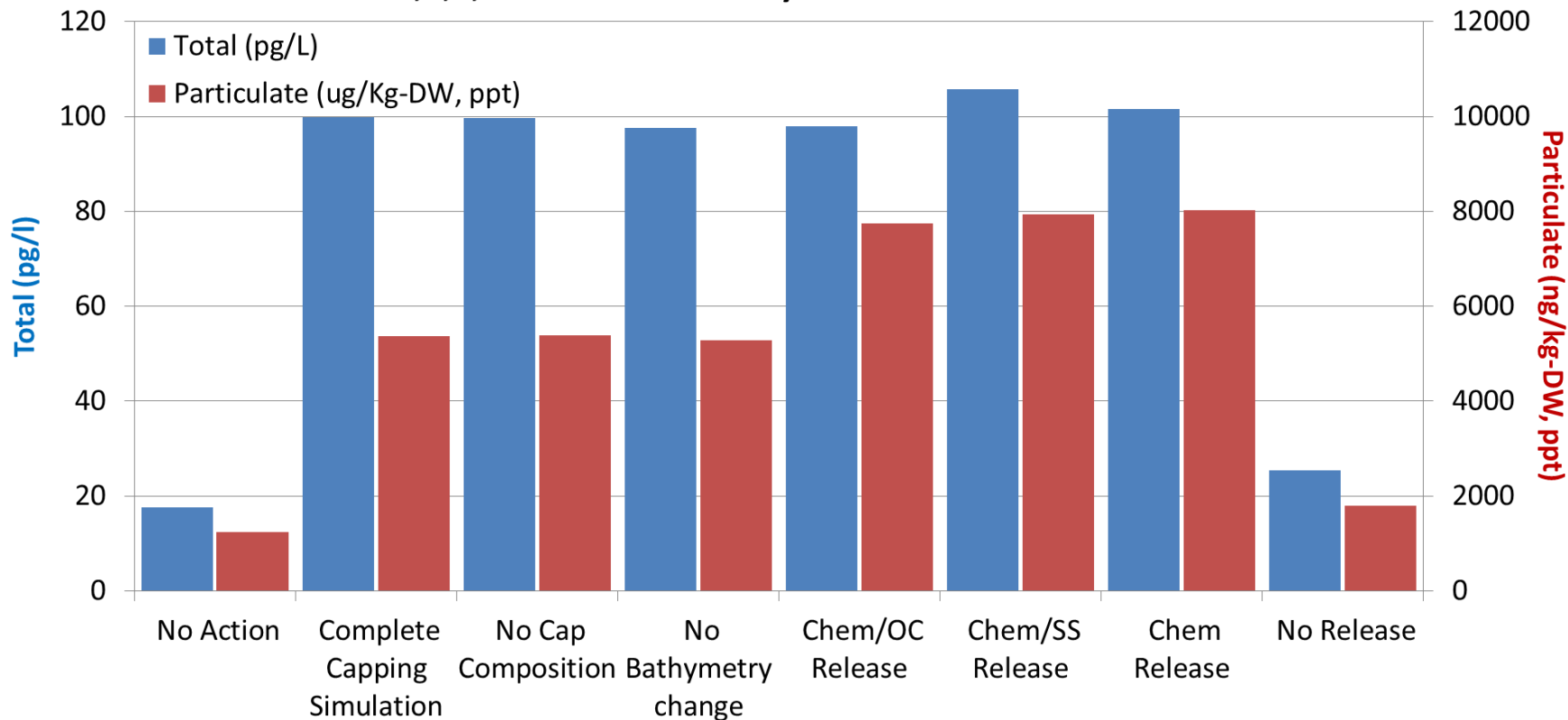
Dredging Rate
= 1275 yd³/day

Dredging Loss
= 3%

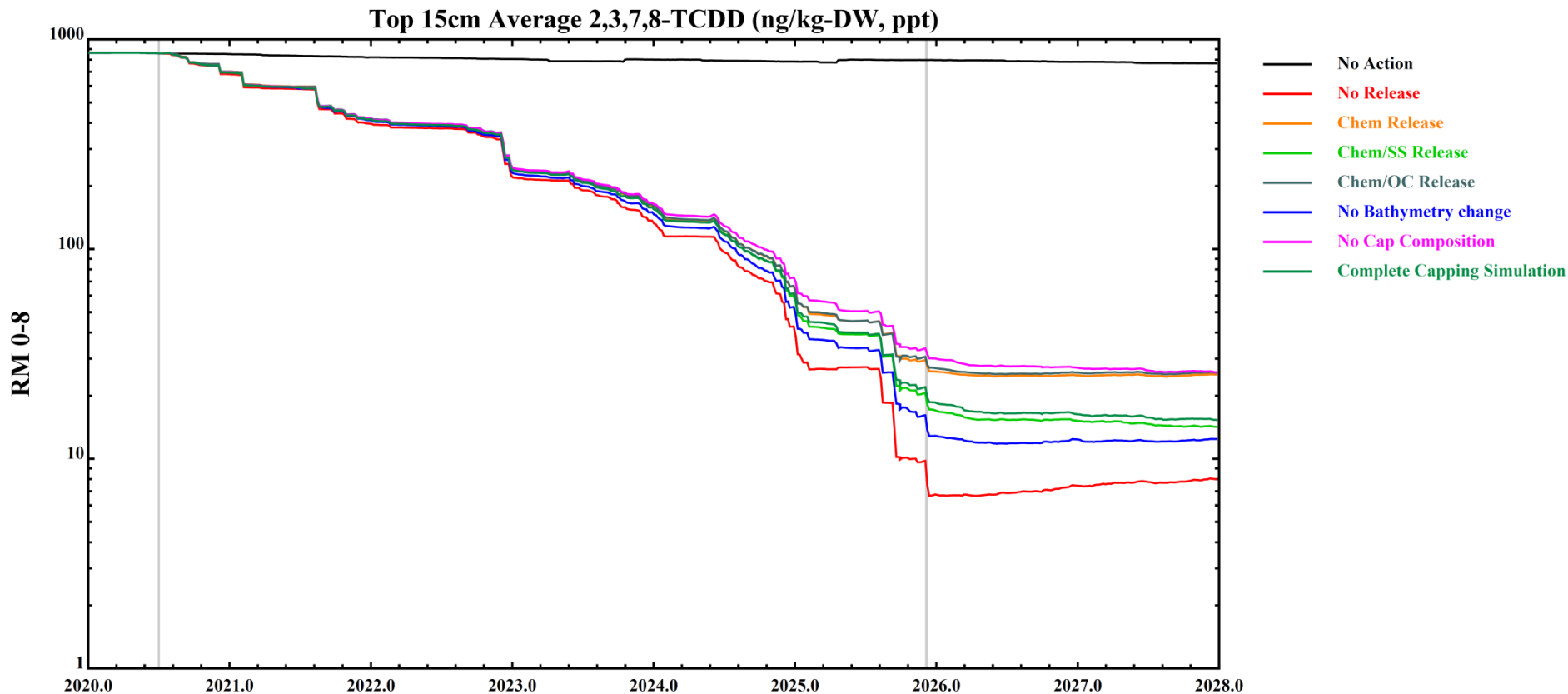


Model Simulation, Water Colum Response

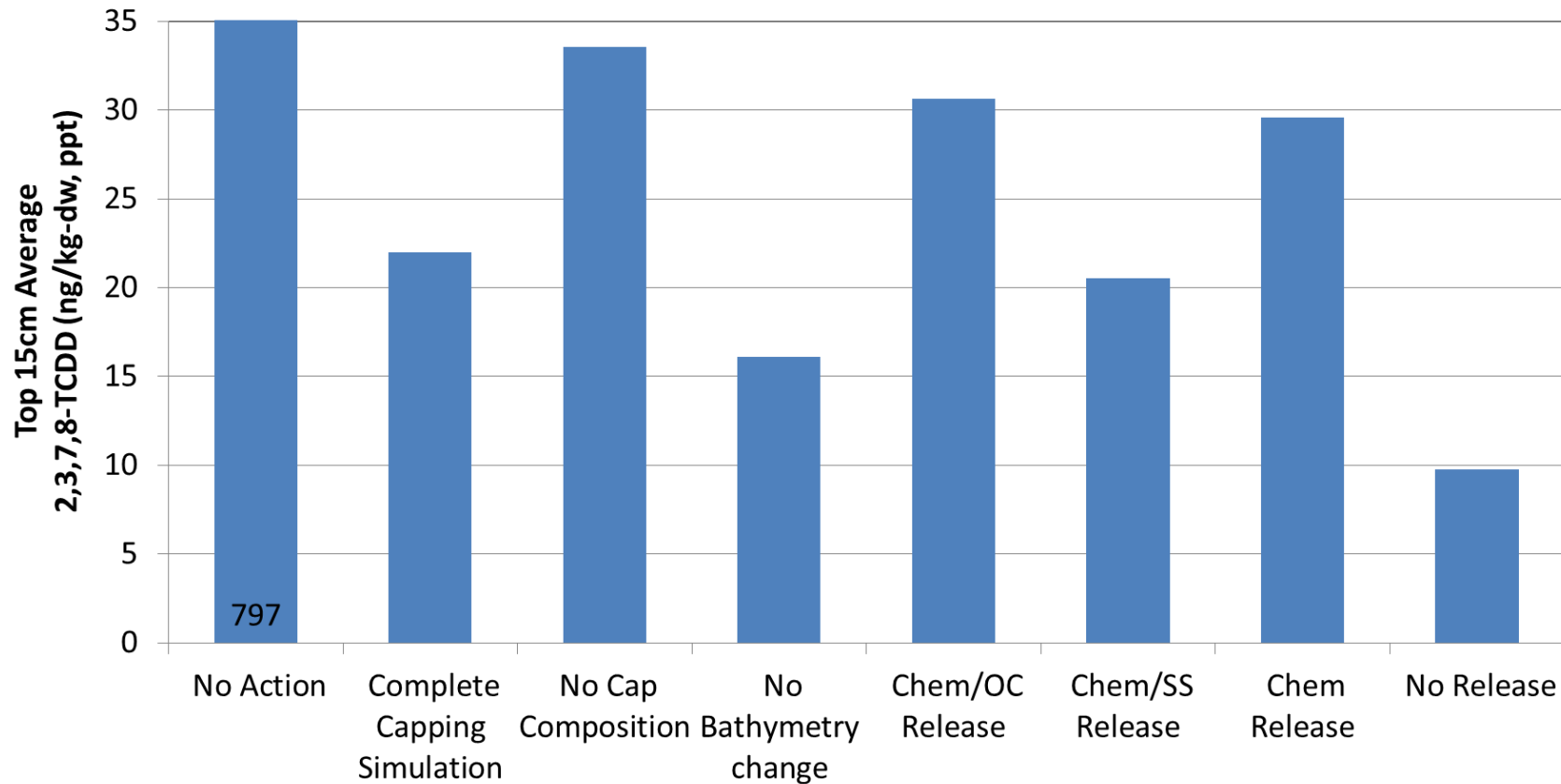
2,3,7,8-TCDD - Bottom Layer of the Water Column



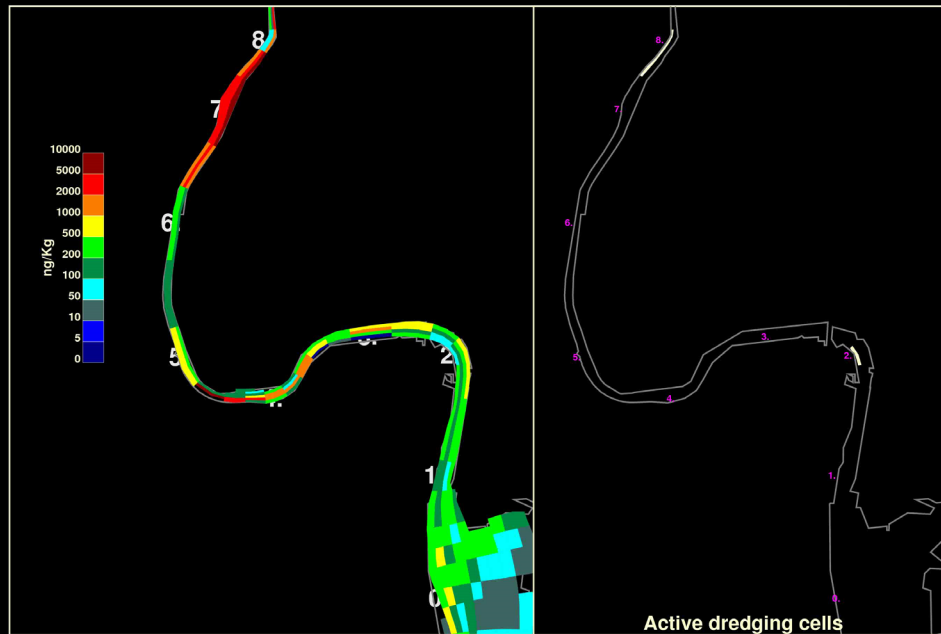
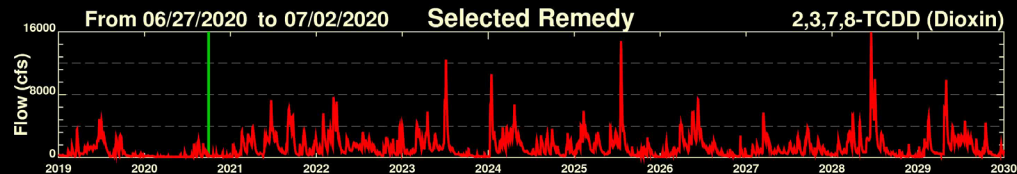
Model Simulation, Reach Average Results



Model Simulation Results at the End of Remediation



Model Simulation, Site Wide Results



Concentration in top 15 cm sediment

Conclusions

- The representation of remediation in numerical models has evolved over time
- The approach used on the Passaic River is a more realistic approach and more conservative than some of the approaches used in the past
- It is important to include the release of contaminant due to dredging in order to represent the impact of remediation on the water column and the sediments in adjacent areas.
- It is also important to represent the release of solids and POC, changes in bathymetry and changes in bed composition associated with remediation in order to appropriately represent remedial impacts.

